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[AN IMPROVED FASTENER ASSEMBLY, FASTENER TAPE MATERIAL, BAG UTILIZING FASTENER TAPE MATERIAL, AND METHOD OF MANUFACTURE THEREOF]

Fastener Tape Material, Bag Utilizing Fastener Tape Material, and Method of Manufacture Thereof

BACKGROUND OF THE INVENTION

This application is a voluntary divisional patent application of United States Patent Application Serial No. 08/899,434 filed July 24, 1997. This application claims priority from [Patent Cooperation Treaty] United States Provisional Patent Application Serial No. [97/US713028] 60/022,353 filed July 24, [1997, which in turn claims priority from] 1996; United States Provisional Patent Application Serial No. 60/036,186 filed January 18, 1997, and United States Provisional Patents Application Serial No. 60/035,051 filed January 22, [1997,] 1997 all invented by the present inventor, James R. Johnson. This invention relates generally to reclosable plastic bags and in particular to [fastener assemblies for such bags,] tape [having reclosable fasteners thereon] used in the manufacture of reclosable plastic bags, the web that the bags are made from, methods related to their manufacture, and an apparatus for manufacturing reclosable bags that is more efficient and economical than conventional methods and devices.

While most packaging is done with polyethylene sheeting, or [multilayer sheeting that includes] a polyethylene [layer,] sealant layer if barrier sheeting is used, there are problems [in] of sealing the intended sealant layer of the bag wall to reclosable profiles [to the such sheeting due to the thickness of the profiles, or the thickness] due to profile thicknesses, or due to the thicknesses of flange material that may be integral with the profile, even if the surfaces to be sealed are both polyethylene and compatible.

[profile. Sealing is even more difficult]

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There are even more complex problems when the sealant layer of the bag walls is something other than polyethylene, [such as oriented polypropylene, for example, used in potato chip bags. An additional problem is to manufacture reclosable bags which would remain closed until opened by the user. The present invention provides apparatus, methods and materials for sealing] as the inside bag wall layer of oriented polypropylene sealant layer of potato chip bags. Sealing reclosable materials to this wall means using materials that are compatible. This invention gives a practical means [profiles to sheeting, and for making bags in an efficient and practical manner.] to accomplish these results.

[Prior art such as] U.S. Patent No. 4,909,017, McMahon discloses the delivery of a pair of interlocked, profiled fasteners transversely across a web of film, [to be] used in forming a plurality of bags. However, the system of McMahon [disclosure] is non-enabling in that fastener strips cannot be delivered as described therein.

[therein. Also, the] There is no attempt in the written description to describe how the narrow fastener strip can be fed, held and sealed onto the base web. The strip material [shown, if sealed in the center,] would be unstable for sealing due to the rib and groove design, which would [rock. Similarly, the] rock on center. The strip material is naturally curled from extrusion and distorted from being wound onto a spool. The difficulty of feeding this unstable strip cross web, remove curls and twists, stretch straight and hold for heat and pressure application between a seal bar and anvil makes this method chaotic and impractical.

There are at least two other major shortcomings of the McMahon '017 patent. The first shortcoming involves the impossibility of making commercially acceptable seals of the bag walls to the backside of each fastener half in the bagger sealing jaws. The second shortcoming

involves the window of registration required to seal the backside of the fastener to a finished bag wall during bagger cross [sealing;] sealing and the inability of known form fill seal and equipment [cannot] to repeat the bagger film draw[down] with the required accuracy.

Specifically, the McMahon '017 patent describes a pressure bar seal in the bagger sealing jaws that seals the outer bag material precisely to the backside of the fastener profile. Yet, it has been discovered, as [indicated] described in Applicant's specification, that a pressure bar seal requires a stable and flat surface to properly seal. The irregular shape of the [McMahon] fastener profile makes this impossible. One requires heat, dwell time, and pressure to effect a commercially acceptable [seal. Due] seal and due to the irregular shape of the profile, it is impossible to get enough stable pressure to accomplish a commercially acceptable seal. The surface moves and gives unpredictably. If enough heat and pressure are applied for a sufficient dwell time to mash the base of the profile flat enough to seal, the profile hooks are softened and deformed, making it impossible to repeatedly use the completed bag for opening and reclosing. [reclosing. In addition,]

The McMahon '017 patent has an additional shortcoming related to sealing the seamed side of the bag to the opposite side of the fastener. Based on Applicant's knowledge and experience, this cannot be done to produce a commercially acceptable product. The fact is that no bagger can draw with the accuracy the McMahon '017 patent requires, to place the second seal, in register, on the back side of the fastener profiles.

[In] Another illustrative patent is U.S. Patent No. [4,528,224, it has been known to manufacture reclosable fastener assembly in which a pair or even several pairs of male and female profiles interlock. In U.S Patent No. 4,528,224 by inventor Steven Ausnit, such a pair

fastener has shown. In Figure two of Ausnit, a pair of such profiles have flanges which extend] 5,461,845 to Yeager. There are at least two definitive shortcomings therein. The first shortcoming relates to the problem of having to open the zipper completely from the front panel of the finished bag. Users of reclosable bags and packaging are accustomed to opening the profiled [between them. However, the flanges are the same thickness as the entire based of the profiles. Similarly, in U.S. Patent No. 4,264,288, Sandborn, a pair of fastener profiles has flanges extended there between. However, in both cases the fastener profiles are not sufficiently separate so that the flanges extending between them are not relatively ragged but are flexible and are not supportive by the fastener profiles themselves. In U.S. Patent No. 5,509,734 again, pairs of fastener profiles are shown. However, in the '734 patent, a wedge is located between the fastener profiles.]

[U.S. Patent No. 4,993,844 discloses a complimentary interlock strip extruded with and mounted on strips of plastic material. Similarly, U.S. Patent No. 5, 071,689, discloses strips of extruded plastic zipper sections. However, none of the foresaid patents discloses sealing of reclosable fastener assembly to tape strips of tape are in return are sealed to or webs of bag making materials.]

[PCT application number 97/06062, published February 20, 1997 discloses a zipper film and bag in which a reclosable bag has a reclosable refastener assembly connected to a single wall of the bag in which the film of the bag has a reclosable fastener connected to one side thereof which does not requires attachment to any other] fastener from the "top" of the package, and not from the front panel of the package. Hence, the user will have to become accustomed to a method with which he may not be familiar or comfortable.

The second shortcoming is more serious, and relates to the requirement of opening the package from the front panel thereof. If the package is to be opened from the front panel, a cut or perforation must be made before the fastener is applied. This cut, or perforation, is generally shaped like an "oval" with opening "tabs" for gaining access to the fastener. Since the fastener, most likely, is not closed at the ends of the fastener, the possibility of contamination exists.

The most expedient and economical way to make the package is to create the cut, or perforation, in one operation, just upstream of the fastener strip application. This operation, in its simplest form, will leave openings for potential contamination to pass through the cut or perforated, front panel opening. To overcome this contamination potential, users of this method add a great deal more cost and complexity to create a sealed, sealable "patch", or some other means of eliminating this contamination risk. The same problem occurs, if the package must be hermetically sealed.

There is also a serious drawback of coextruding a flanged zipper having ribs on the inside of the flanges so that it is unsealable, when heat is applied to each bag wall side. The drawback is that a unitary extruded flanged zipper has a limitation as to thinness of the flanges that can be integrally extruded with reclosable profile. Further, use of co-extruded ribs to make the inside of the flanges not seal together increases the thickness of the flange area even more.

This contrast in thickness of the 4 layers of material which includes the 2 bag walls and the 2 zipper flanges will make it virtually impossible to blend the cross seals through the 4 thickness area and into the 2 thickness area of the bag walls only. For example, if a 3 millimeter: i.e., "mils" wall bag is being made, the coextruded flange with ribs, will be 16 mils per side or 32 mils total. This would require a blending of 38 mils to 6 mils and would most likely

eliminate the possibility of closing off openings in the folds of any bag made on a vertical FFS machine.

[portion of the film when making the bag. This differs from the present invention in which the fasteners attached to both wall of the bag, either directly or intermediate tape material.]

Thus, there exists a need to solve the problems in the art that are articulated above.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the [present] invention to overcome the shortcomings of the prior art by providing a [fastener assembly which is easier to seal to flexible film than prior art fasteners. It is an additional object of the invention to provide a fastener assembly in which thickened sealing bridges are positioned between a pair] large skirt (tape) area which a second seal can be easily registered. The skirt (tape) height of the area could be changed, depending upon the bagger design, condition, and the variation in draw height of the bagger.

[of profiles, as to facilitate sealing. It is a further object of the invention to provide a fastener assembly having opposing dual profile closure elements in which one of the male profiles has a layer head or barb, the other male profile, thereby making that side of the fastener assembly (the consumer side) harder to open so as to prevent product from inadvertently forcing the bag open. It is an additional object of the invention to utilize]

It is another object of this invention to overcome the shortcomings of the art by using fastener profile mounted on tape in the bag forming process, [thus] and requiring that the operations involved sealing two flat, substantially parallel [surfaces together. As a result,] thin surfaces. Thus, there is no irregular surface that is sealed to attach the fastener to the front panel, or to carry the fastener through the bagger and down the form, fill and seal tube or to seal the

back-seamed side of the package. It is also an object of the present invention to allow the customer/user of the package to open the package from the top, as he or she is accustomed.

It is an additional object of the invention to treat the inside surface of the skirt (tape) area to prevent area from being sealed together in the process described below, to allow zipper and bag opening from this area.

It is an additional, object of the invention to solve the shortcomings of the art through the use of fastener tape [to which the fastener assembly is attached as] as described below, to provide a thin substantially [flat surface] flat, fastener appendage which is sealed to the bag [wall(s)]. It is an additional object of the invention to treat the inside surface of the area to prevent area from being sealed together during the process described below, to allow zipper and bag opening from this area.] wall(s) and to treat the inside layers of the fastener opening tabs, above the fastener.

It is a further object of the invention to provide an automatic contamination-free package by sealing the fastener completely inside the package. In this variant, the top seal of the package must be cut off to allow the customer/user to get to the opening tabs of the fastener.

It is [an additional] a further object of the invention to [provide] [provide] provide improved control of web dispensing by using driven, dancered unwinding of the base web and indexing of the base web for zipper application positioning. The zipper application includes a servo motor and computerized motor controls.

It is an additional object of the invention to provide unwinding, tensioning, guiding and indexing of the fastener tape materials in the attachment thereof to a web, linked to the indexing of web but independent thereof.

It is a further object of the invention to obtain a balance of tensions between the fastener strip and tape material by providing a driven, danced web for feeding folded and lightly-tensioned tape material to a fastener sealing device.

It is yet a further object of the invention to obtain a flatter, straighter, curl-less fastener tape from the fastener tape operation by more accurately controlling the relative tensions of the webless fastener and the tape material during application of the fastener material to the tape.

It is another object of the present invention to solve these and other problems in the art, and to serve a market that demands hundreds of millions of reclosable plastic bags annually. The objects and features of the present invention, other than those specifically set forth above, will become apparent in the detailed description of the invention set forth below and in the drawings.

The invention also provides a method of making a reclosable bag having a body with top and bottom ends and opposing walls in a vertical, form, fill and seal machine that includes the steps of forming the bag walls from web material having a longitudinal back seal extending between the top and bottom ends of the bag body, and transversely securing across the longitudinal back seal a flange of a flanged, interlocked fastener strip. The flange is substantially wider than the width of the interlocked fastener strip attached to the flange. As such, it is appreciated that the sealer bars do not contact or deform the interlocked fastener strip during the sealing process. It is further appreciated that the method allows for a commercially acceptable seal to be made across the longitudinal back seal while providing greater tolerance for deviations in bagger web draw.

The flange or tape is sized and dimensioned to provide a larger window of registration than that required to seal the backside of a conventional fastener onto a finished bag wall whether

it is a back or front panel wall, directly onto the backside of the fastener during bagger cross sealing. The flange or tape is also sized and dimensioned to provide repeatable sealing of the tape or flange to the bag wall during the transverse bagger cross sealing process while allowing for variances and deviations in bagger web draw.

The invention further includes an improved vertical, form, fill and seal process that includes transversely sealing a non-profiled, stable and substantially flat surfaced appendage or flange having a profiled, interlocked, reclosable fastener strip connected thereto across the longitudinally extending back seal of a bag during bagger cross sealing. It is appreciated that

- the transverse sealing across the non-profiled, stable and substantially flat surfaced appendage permits one to seal the appendage to bag material with an effective heat, dwell time, and pressure to effect a commercially acceptable seal without the surface moving and giving unpredictably. It is also appreciated that greater, pressure and dwell can be applied to mash the shape flat enough to seal, while simultaneously preventing the profiled fastener from softening and deforming making it possible to repeatedly use the completed bag for opening and reclosing.

In a variant, as described above the invention provides a two piece tape or flange comprising a very thin, substantially flat, tape or flange portion connected to the zipper profiles to obtain a commercially acceptable flanged zipper. The very thin, substantially flat, tape or flange portion is preferably construct from web material of about 0.003" in thickness that is very flexible. It is also possible to use tape materials in the range of about 0.003" inches in thickness to as thin as 0.001" in thickness. The preferred loop is a high loop of about 1.25". By using a high loop it is possible to obtain enough stiffness in the combination tape/flange fastener profile assembly to push the assembly at the start of the transverse application process, and then attach

the thin, flexible, wide loop quickly to a vacuum belt, so that it can be carried across the base web for positioning. Holding and transporting the flexible loop (or flange if the loop is split open) across the web is readily accomplished using a modest amount of vacuum. A printed barrier can be applied to the inside loop area to make it non-sealable, while adding very little to the thickness of the loop.

The system method, and [tape] (tape or flange) assembly described above is extremely versatile. The tape or flange is substantially thin allowing its use with a greater variety of bag walls materials, regardless of the base web thickness. The tape or flange, since it is ribless and thin, blends the cross seals better, from tape plus bag wall thickness to bag wall thickness only, and results in continuous seals, sealed in the bagger sealing jaws.

Further, the assembly described above is constructed to be readily, transversely "pulled" across a web of material, and the assembly method, and system can be used with any appropriate tape base material. [The] As described above, the invention described above can be used on laminate bag wall base web material, e.g. snack food bag wall and base web material where a user does not want to change their present structure/bag wall [material, which does not easily seal to LDPE (Low Density Polyethylene) material.]

material which would not seal to LDPE material. The preferred non-sealable treatment of the tape or flange is to provide a printed food grade nitro cellulose coating into the loop (flap) area. As such, the invention provides a two-piece [The objects and features of the present invention, other than those specifically set forth above, will become apparent in the detailed description of the invention set forth below and in the drawings.]

fastener profile having each respective profile connected to a loop portion of a tape or flange in which the inside loop portion of the tape or flange is treated to be non-sealable, e.g. has a non-sealing inside surface.

BRIEF DESCRIPTION OF THE DRAWINGS

The present application includes at least one drawing and/or photograph executed in color.
Copies of this patent with color drawing(s)/photograph(s) will be provided by the Patent and
Trademark Office upon request and payment of the necessary fee.

FIG. 1 is a schematic representation of the system for performing the processes of the present invention;

FIG. 2 is a schematic representation of a sub-assembly of an apparatus used in the system of FIG. 1;

FIG. 3 is a flow chart of a routine of the present invention;

FIG. 4 is a perspective view of the tape of FIG. 6 being ultrasonically staked to the web;

FIG. 5 is a perspective view of a web of the present invention;

FIG. 6 is a side cross sectional view of a tape of the present invention;

FIG. 7 is a side cross sectional view of a flange of the fastener of the present invention;

FIG. 8 is a side cross sectional view of a variant of a flange of the present invention of FIG. 7;

FIG. 9 is a side cross sectional view of a flange of the present invention;

FIG. 10 is a side cross sectional view of an assembled bag of the present invention;

FIG. 11 is a front plan view of the bag of FIG. 10;

FIG. 12 is a side cross sectional view of a variant of the bag of the invention and sealing bars;

FIG. 13 is a side cross sectional view of a flange of the invention;

FIG. 14 is a side cross sectional view of the bag material and a flange of the invention;

FIG. 15 is a side cross sectional view of a bag of the invention having the tape of FIG. 14;

FIG. 16 is an exploded side cross sectional view of an upper portion of a bag of the present invention having a fastener tape connected thereto in which the fastener is in an open position;

FIG. 17 is a top plan view of a web having fastener tape segments thereon;

FIG. 18 is a side cross sectional view of a portion of the web having fastener tape segments of FIG. 17;

FIG. 19 is a top plan view of the bag including the portion of the bag shown in FIG. 16;

FIG. 20 is a side perspective view of the fastener tape dispensing assembly of the present invention;

FIG. 20-A is a side view, partially broken away, of the fastener tape dispensing assembly of the present invention;

FIG. 20-B is a side view, partially broken away, of the fastener tape dispensing assembly of FIG 20.

FIG. 21 is rear perspective view of the fastener tape dispensing assembly of FIG. 20;

FIG. 22 is a side perspective view illustrating an ultrasonic sealing horn and cutter and the fastener tape dispensing assembly of FIG. 20;

FIG. 23 is a rear perspective view illustrating the ultrasonic sealing horn and cutter of FIG. 22;

FIG. 24 is a rear perspective view illustrating a zipper spool drive and the fastener tape dispensing assembly of FIG. 22;

FIG. 25 is a side perspective view of a web material dispensing assembly of the form fill seal machine of the present invention and a roll of web material;

FIG. 26 is a rear perspective view of a web material dispensing assembly of FIG. 25;

FIG. 27 is a front perspective view of the vacuum belt and sealing bar assembly of the present invention;

FIG. 28 is a front perspective view of the vacuum belt and sealing bar assembly of FIG. 27 and the web having fastener tape segments of FIG. 17;

FIG. 29 is a side perspective view of two sets of dancer rollers through which the web having fastener tape segments of FIG. 17 is fed through the present invention;

FIG. 30 is a perspective view of the web having fastener tape segments of FIG. 17 as it moves over a forming collar of a form fill seal machine;

FIG. 31 is a side perspective view of the forming collar of FIG. 30;

FIG. 32 is a front view of a form fill seal machine;

FIG. 33 is a close up view of sealing bars and a cutting knife of FIG. 32;

FIG. 34 is a top plan view of laminate material used in the manufacture of fastener tape;

FIG. 35 is a side cross-sectional view of an interior cap sealed to a base web of a partially processed fastener tape assembly;

FIG. 36 is a side cross-sectional view of the partially processed fastener tape assembly of FIG. 35 after a folding operation;

FIG. 37 is a side cross sectional view of the partially processed fastener tape assembly of FIG. 36 having a fastener sealed to the sealant layer of the base web;

FIG. 38 is a side cross sectional view of the partially processed fastener tape assembly of FIG. 36 having a fastener sealed to the interior cap at ends thereof;

FIG. 39 is a side cross sectional view of a variant of FIG. 37 having a sealed header portion thereof;

FIG. 39a is a top plan view of a reclosable bag utilizing the web of FIG. 35;

FIG. 40 shows a variant of the top of the bag of FIG. 19 in which gripping flanges are provided above an adhesive seal sealing the bag wall together;

FIG. 41 is a diagram of an apparatus for forming the fastener tape illustrated in FIG. 20, 21 and 23;

FIG. 42 is a side cross sectional view of a variant of the fastener tape described herein having a non-sealing nitrocellulose coating thereon; and,

FIG. 43 illustrates a top plan view of a variant of a top portion of a reclosable bag of the invention.

FIG. 44 is a front elevational view of the improved reclosable plastic bag of the present invention;

FIG. 45 illustrates a perspective sectional view of an improved reclosable plastic bag of the present invention of FIG. 44;

FIG. 46 is a perspective view of a vertical bag forming, filling and sealing apparatus for manufacturing bags of the present invention;

FIG. 47 is a perspective view of a roll of web of the present invention;

FIG. 48 is a side cross-sectional view of an optional recloseable flange of the present invention;

FIG. 49 is a partial side cross-sectional view of the recloseable flange of FIG. 48 connected to a web wall;

FIG. 50 is a partial side cross-sectional view of an optional recloseable tape of FIG. 51 in an assembled bag of the present invention;

FIG. 51 is a side cross-sectional view of an optional recloseable tape of the present invention;

FIG. 52 is a partial side cross-sectional view of the recloseable tape of FIG. 51 connected to a web wall;

FIG. 53 is a partial side cross-sectional view of the recloseable flange of FIG. 48 in an assembled bag of the present invention;

FIG. 54 is a side view of a variant of the flange of FIG. 48;

FIG. 55 is a side cross sectional view of the flange of FIG. 54 in an assembled bag of the invention;

FIG. 56 is a perspective view of an apparatus to manufacture web material that is used with the vertical bag forming, filling and sealing apparatus of FIG. 46; and,

FIG. 57 is a side cross sectional view of the bag of FIG. 53 upon severance of the top portion thereof.